DATE OF ISSUE : 2009. 07. 01

# SPECIFICATION

MODEL : SPMAMB5204

Approved rank : $V_F$(S0), $\lambda_D$(E1,E2), $I_V$(S0)

## AMBER LED

*SAMSUNG LED CO., LTD.*
314. MAETAN 3-DONG, YEONGTONG-GU,
SUWON-SI,GYEONGGI-DO,KOREA,443-743

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# 1. Product Outline

1) Feature

. Lead Frame Type LED Package ( 5.2 * 6.0 * t 1.3mm )

. Beam Angle ( △θ : 120 °)

. AlGaInP Chip & Long Time Reliability

2) Applications

. Indoor, Outdoor Display and etc.

# 2. Absolute Maximum Rating

1). Operation Forward Current Per Chip..... 30 ㎃

2). Peak Pulsed Forward Current Per Chip..... 100 ㎃

(Duty 1/10 Pulse Width 10msec)

3). Reverse Voltage..... 10 V

4). Operating Temperature Range ( $T_{opr}$ ) ..... -30℃ ~ 85℃

5). Storage Temperature Range ( $T_{stg}$ ) ..... -40℃ ~ 100℃

-. $I_{FP}$ Conditions : Duty 1/10 Pulse Width 10 ㎳

# 3. Characteristics

## Electrical/ Optical Characteristics

( Ta : 25 ℃ )

| Item | Symbol | Conditions | Rank | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Forward Voltage (*) | $V_F$ | $I_F$ = 40 ㎃ | S0 | 1.7 | - | 2.6 | V |
| Reverse Current | $I_R$ | $V_R$ = 5 V | - | - | - | 100 | ㎂ |

## Dominant Wavelength

( Ta : 25°C )

| Item | Symbol | Condition | Rank | | Model Name | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|---|---|
| Dominant Wavelength (*) | $\lambda_D$ | $I_F$ = 40 ㎃ | GE | E1 | SPMAMB5204N0S0E1S0 | 583 | | 589 | nm |
| | | | | E2 | SPMAMB5204N0S0E2S0 | 589 | | 595 | |

## Luminous Intensity

( Ta : 25 ℃ )

| Item | Symbol | Condition | Rank | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Luminous Intensity (*) | $I_V$ | $I_F$ = 40 ㎃ | S0 | 800 | - | - | mcd |

* Tolerance : $V_F$ ; ±0.1V, $\lambda_D$ ; ±2㎚, $I_V$ ; ±10%

* Luminous intensity measuring equipment : CAS140CT

※ Approved Rank

| $V_F$ | $\lambda_D$ | $I_v$ |
|---|---|---|
| S0 | E1, E2 | S0 |

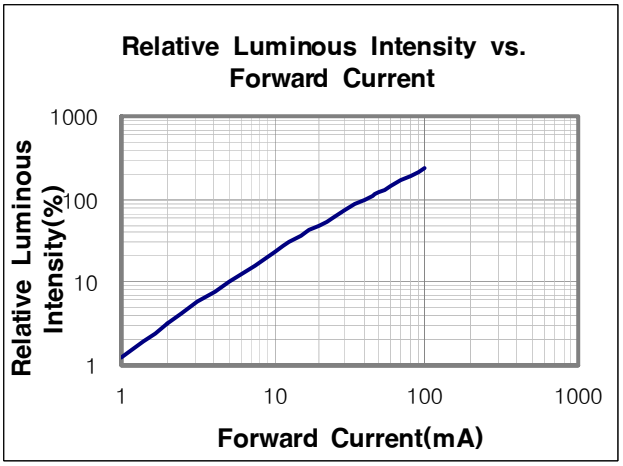
* Each reel contains only one of the E1, E2 a segment (1/2) of the GE rank.

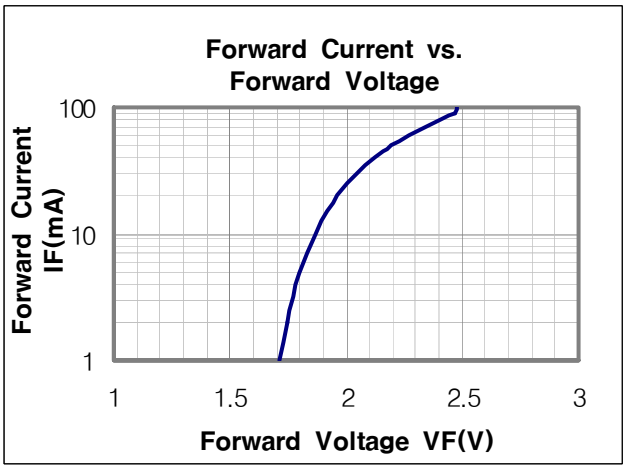
※ Special Approved Rank

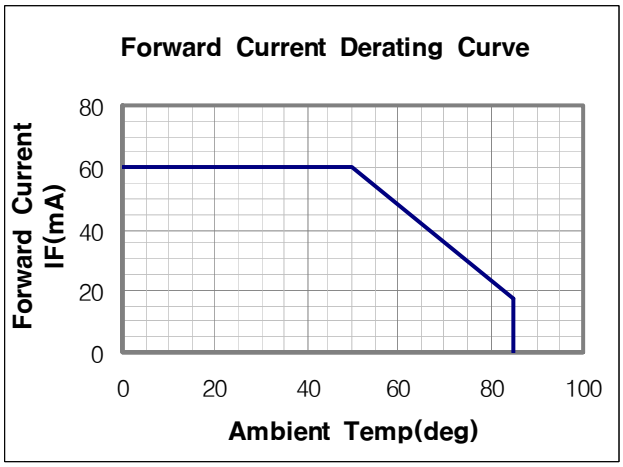
| $V_F$ | $\lambda_D$ | $I_v$ |
|---|---|---|
| - | - | - |

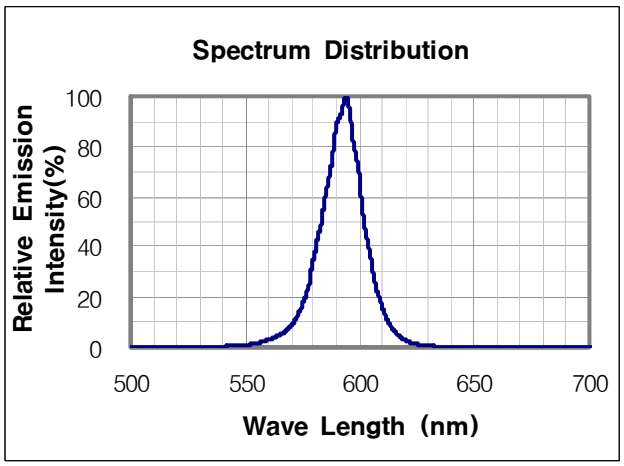
# 4. Typical Characteristics Graph

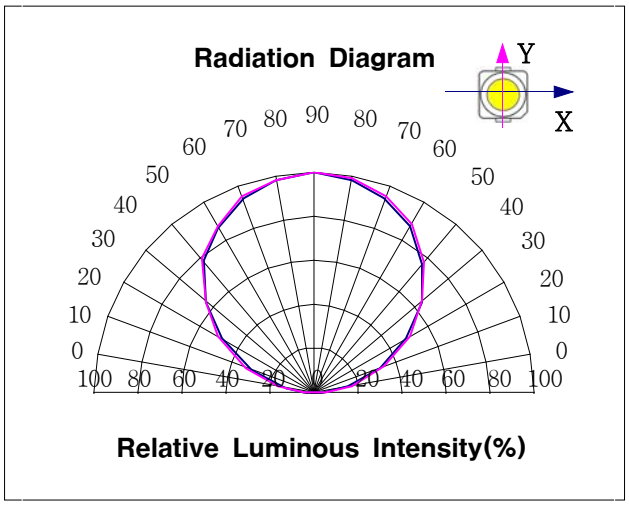
( Ta : 25°C )



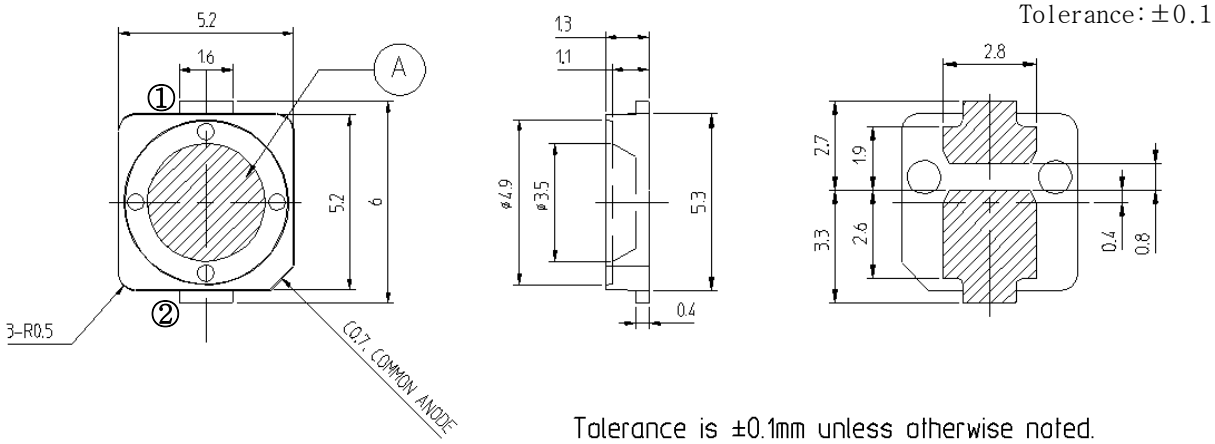



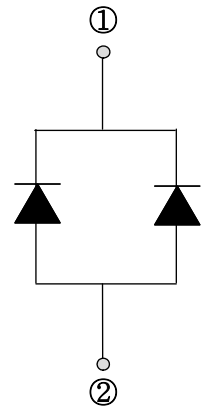



# 5. LED Package Outline Dimensions

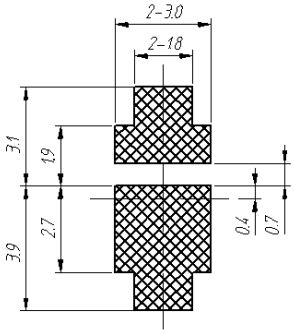
unit:mm
Tolerance:±0.1



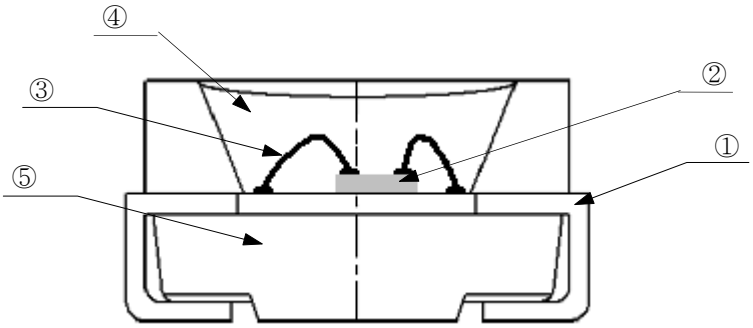

Tolerance is ±0.1mm unless otherwise noted.
The maximum compressing pressure is 15N.
Do not apply any damage on the phosphor ( "A" ).




Circuit Diagram



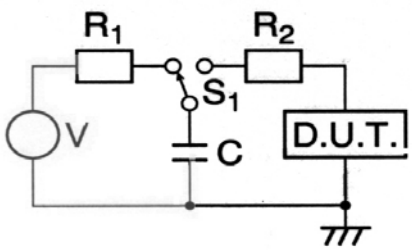

PCB PATTERN




| NUMBER | ITEM | MATERIAL |
|---|---|---|
| ① | FRAME | Copper Frame(Silver Plated) |
| ② | LED CHIP | AlGaInP/AlN |
| ③ | WIRE | Gold Wire |
| ④ | RESIN | Resin |
| ⑤ | PACKAGE | Heat-resistant Polymer |

# 6. Reliability Test Items and Conditions

## 1) Test Items

| Test Item | Test Conditions | Test Hours/Cycles | Sample No |
|---|---|---|---|
| Room Temperature life test | 25℃±3℃, DC60 ㎃ | 500 h | 50 |
| High Temperature humidity life test | 60℃±3℃, 95%±2%RH, DC45 ㎃ | 500 h | 50 |
| High Temperature life test | 85℃±3℃, DC17.5㎃ | 500 h | 50 |
| Low Temperature life test | -30℃±3℃, DC60 ㎃ | 500 h | 50 |
| High Temperature Storage | Ta=100℃±3℃ | 500 h | 22 |
| Low Temperature Storage | Ta=-40℃±3℃ | 500 h | 22 |
| High Temperature humidity Storage | 60℃±3℃, 95%±2%RH | 500 h | 22 |
| Thermal Shock | -40℃ ~ 100℃<br>0.5 h 0.5 h | 100 cycles | 50 |
| Temperature humidity Cycle | 25℃ ~ 65℃ ~ -10℃<br>24hrs/1cycle, 95%RH | 10 cycles | 22 |
| Reflow (Pb-Free) | Peak 260±5℃ for 10sec | 3 times | 22 |
| ESD(HBM) |  <br>-R1:10MΩ , R2:1.5KΩ , C:100pF | 5 times | 5 |
| On/Off test | 50℃±3℃, 95%±2%RH,<br>DC60 ㎃, On/2sec, Off/2sec | 108000 cycles | 50 |

### 2) Criteria for Judging the Damage

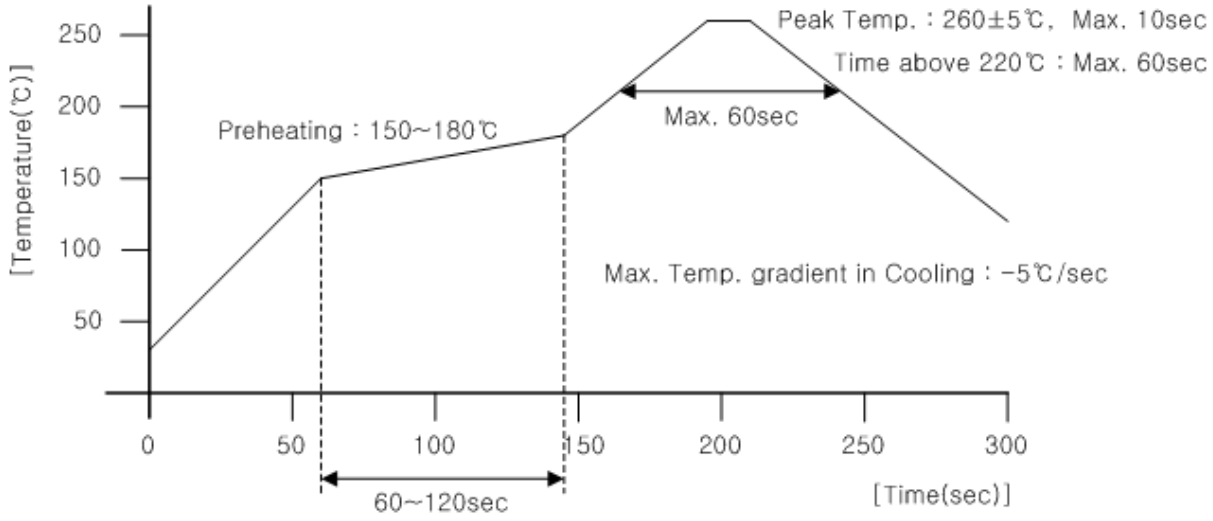
| Item | Symbol | Test Condition | Limit | |
|---|---|---|---|---|
| | | | Min | Max |
| Forward Voltage | $V_F$ | $I_F$ = 40mA | - | U.S.L.*1.2 |
| Luminous Intensity | $I_V$ | $I_F$ = 40mA | L.S.L.*0.5 | - |

* USL : Upper Standard Level  LSL : Lower Standard Level

## 7. Solder Conditions

### 1) Reflow Conditions ( Pb Free )

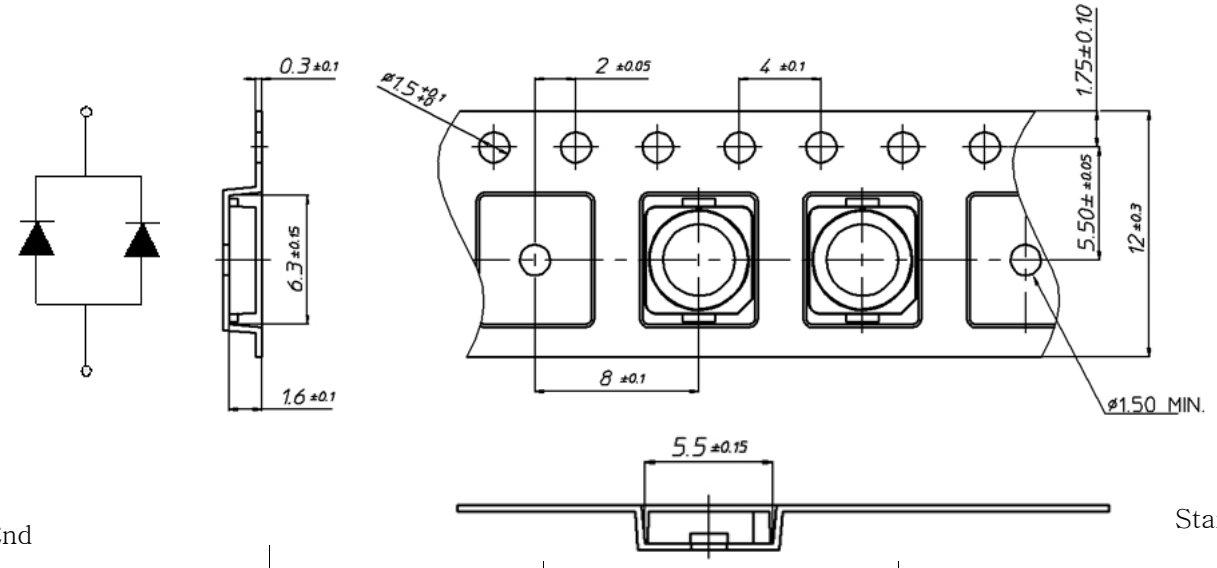
Reflow Frequency : 2 times max.




### 2) For Manual Soldering

Not more than 5 seconds @MAX300℃, under soldering iron.(one time only)

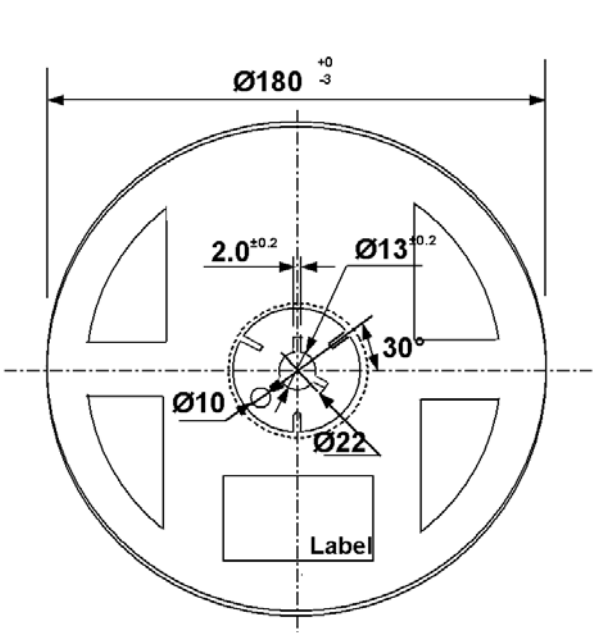
# 8. Taping Dimension

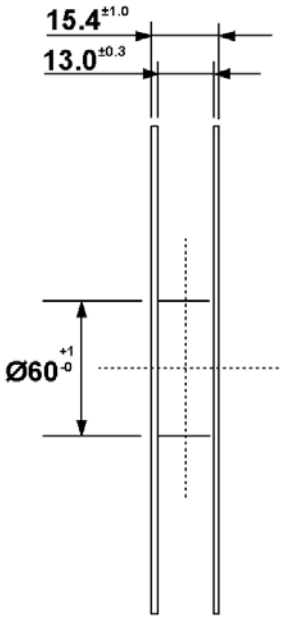



End

Start

| More than 40 ㎜ Unloaded tape | Mounted with Flash LED | More than (100~200)㎜ Unloaded tape | Leading part more than (200~400)㎜ |
|---|---|---|---|




**Tolerance ±0.2 , Unit:mm**

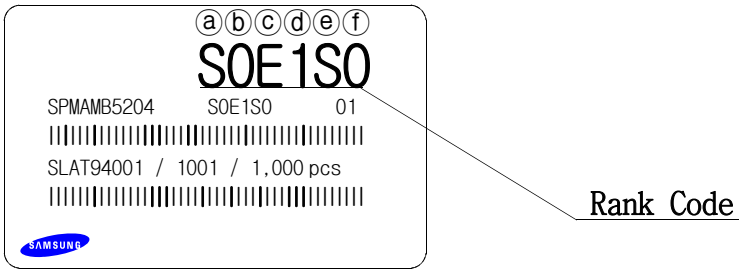
(1) Quantity : The quantity/reel to be 1000pcs.

(2) Cumulative Tolerance : Cumulative tolerance/10 pitches to be ±0.2 ㎜

(3) Adhesion Strength of Cover Tape : Adhesion strength to be 0.1-0.7N when the cover tape is turned off from the carrier tape at 10℃ angle to be the carrier tape.

(4) Packaging : P/N, Manufacturing data code no. and quantity to be indicated on a damp proof package.

# 9. Label Structure




N.B) Denoted rank is the only example.

## Rank Code

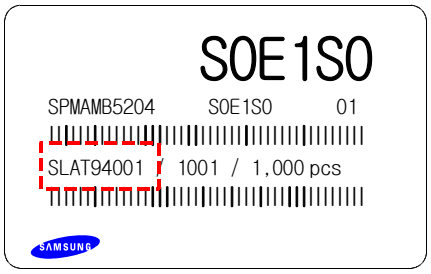
ⓐⓑ : Forward Voltage($V_F$) Rank (refer to page. 3)

ⓒⓓ : Wavelength Rank($\lambda_D$) (refer to page. 3)

ⓔⓕ : Luminous Intensity($I_V$) Rank (refer to page. 3)

# 10 Lot Number

The Lot number is composed of the following characters




①②③④⑤⑥⑦⑧⑨ / 1ⓐⓑⓒ / 2,000 PCS

① : Production Site (S:SAMSUNG LED, GOSIN CHINA, I: Apro)

② : L (LED)

③ : Product State (A:Normality, B:Bulk, C:First Production, R:Reproduction, S:Sample)

④ : Year (T:2009, U:2010, V:2011...)

⑤ : Month (1 ~ 9, A, B)

⑥ : Day (1 ~ 9, A, B ~ V)

⑦⑧⑨ : SAMSUNG LED Product number (1 ~ 999)

ⓐⓑⓒ : Reel Number (1 ~ 999)

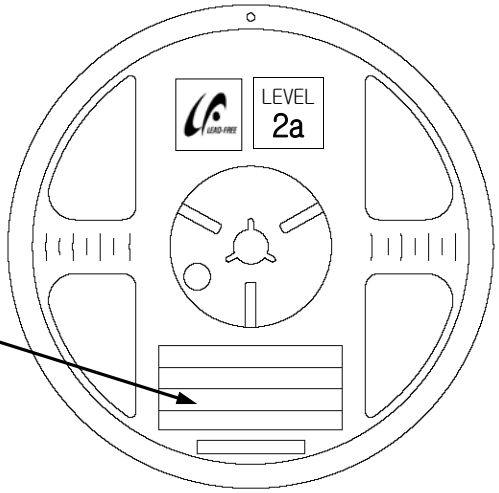
# 11. Reel Packing Structure

## Reel

S0E1S0

SPMAMB5204 S0E1S0 01

SLAT94001 / 1001 / 1,000 pcs




## Aluminum Vinyl Bag

S0E1S0

SPMAMB5204 S0E1S0 01

SLAT94001 / 1001 / 1,000 pcs


Material : Paper(SW3B(B))

| TYPE | SIZE(mm) | | |
|---|---|---|---|
| | L | W | H |
| 7inch | 245 | 220 | 182 |

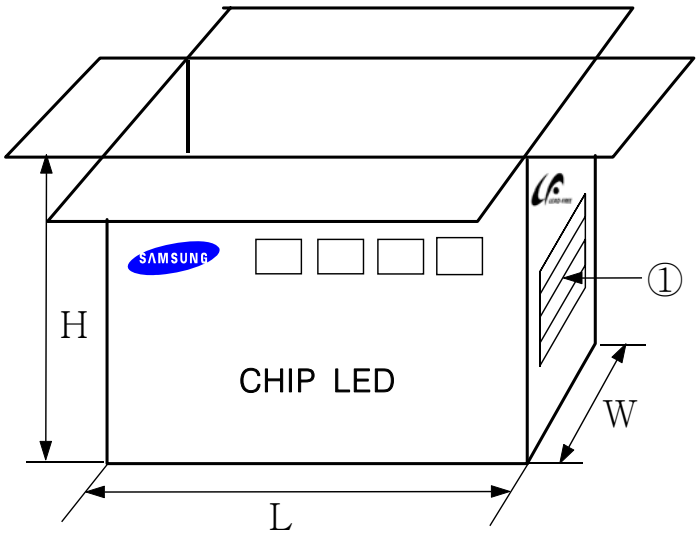
① SIDE

S0E1S0

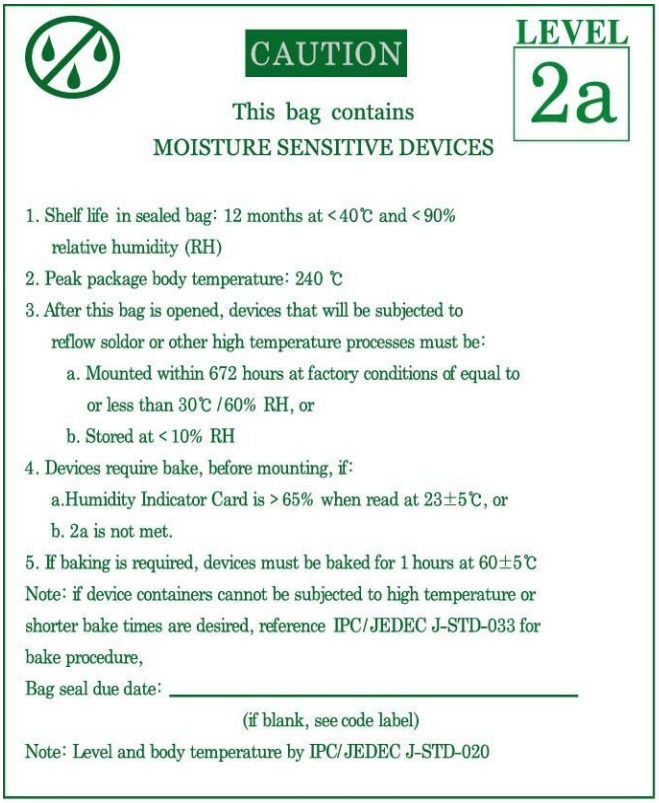
SPMAMB5204 S0E1S0 01

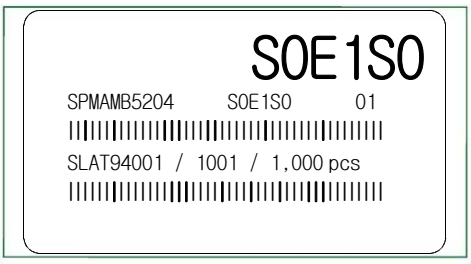
SLAT94001 / 1001 / 10,000 pcs

[Box Label]



# 12. Aluminum Vinyl Bag






■ 주의 사항

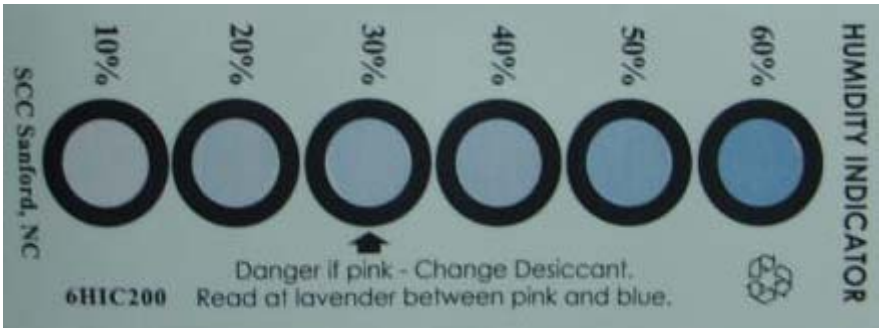
이 알루미늄 지퍼 백은 습기 및 정전기로부터 제품을 보호하기 위하여 제작되었습니다. 개봉 후에는 즉시 솔더 작업을 실시하는 것을 권장합니다.

습기 및 정전기로부터 제품을 보호 하기 위해서 개봉 후 사용하지 않는 자재는 본 팩에 넣어 보관 하시기 바랍니다. 사용하지 않는 자재를 본 팩에 넣을 때는 반드시 동봉된 드라이 팩과 함께 넣고 지퍼부분을 완전하게 밀봉하여 주시기 바랍니다.

■ Important

This Al Zipper bag is designed to protect the enclosed products from moisture and ESD. Once opened, the products should be soldered onto the printed circuit board immediately. When not in use, please do not leave the products unprotected by the Al Zipper Bag. To repack unused products., please ensure the zip-lock is completely sealed with the dry pack left inside.

## Silica gel & Humidity Indicator Card in Aluminum Vinyl Bag

# 13. Precaution for Use

1) For over-current-proof function, customers are recommended to apply resistors to prevent sudden change of the current caused by slight shift of the voltage.

2) This device should not be used in any type of fluid such as water, oil, organic solvent, etc. When washing is required, IPA is recommended to use.

3) When the LEDs illuminate, operating current should be decided after considering the ambient maximum temperature.

4) LEDs must be stored in a clean environment.
If the LEDs are to be stored for 3 months or more after being shipped from SAMSUNG, they should be packed by a sealed container with nitrogen gas injected. (Shelf life of sealed bags: 12 months, temp. 0~40℃, 20~70%RH)

5) After storage bag is open, device subjected to soldering, solder reflow, or other high temperature processes must be:
   a. Mounted within 168 hours (7 days) at an assembly line with a condition of no more than 30℃/60%RH,
   b. Stored at <10% RH

6) Repack unused Products with anti-moisture packing, fold to close any opening and then store in a dry place.

7) Devices require baking before mounting, if humidity card reading is >60% at 23±5℃.

8) Devices must be baked for 24hours at 65±5℃, if baking is required.

9) The LEDs are sensitive to the static electricity and surge. It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs.

   If voltage exceeding the absolute maximum rating is applied to LEDs, it may cause damage or even destruction to LED devices.

   Damaged LEDs may show some unusual characteristics such as increase in leak current, lowered turn-on voltage, or abnormal lighting of LEDs at low current.

# 14. Hazard Substance Analysis

SGS

**Test Report No.** F690501/LF-CTSAYAA09-05676 Issued Date: March 09, 2009 Page 1 of 3

To: **SAMSUNG ELECTRO-MECHANICS CO., LTD.**
314, Maetan3-dong
Yeongtong-gu
Suwon-city
KYUNGGI-DO 442-373
Korea

The following merchandise was submitted and identified by the client as :

| | |
|---|---|
| **Product Name** | : 5252 Amber red |
| **SGS File No.** | : AYAA09-05676 |
| **Received Date** | : March 02, 2009 |
| **Test Performing Date** | : March 03, 2009 |
| **Test Performed** | : SGS Testing Korea tested the sample(s) selected by applicant with following results |
| **Test Results** | : For further details, please refer to following page(s) |
| **Comments** | : By the applicant's specific request, the sampling and testing was performed only for the part indicated in the photo without disassembly. |

**SGS Testing Korea Co. Ltd.**

**Pluto Kim**
**Cindy Park**
**Jinee Song/ Testing Person**

**Jeff Jang / Chemical Lab Mgr**





SGS Testing Korea Co.,Ltd.
322, The O valley, 555-9, Hogye-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080
t +82 (0)31 4808 000 f +82 (0)31 4808 059 http://www.sgslab.co.kr ,www.kr.sgs.com/greenlab
Member of the SGS Group (Société Générale de Surveillance)

SGS

**Test Report No.** F690501/LF-CTSAYAA09-05676 Issued Date: March 09, 2009 Page 2 of 3

**Sample No.** : AYAA09-05676.001

**Sample Description** : 5252 Amber red

**Item No./Part No.** : N/A

**Heavy Metals**

| Test Items | Unit | Test Method | MDL | Results |
|---|---|---|---|---|
| Cadmium (Cd) | mg/kg | With reference to IEC 62321:2008, ICP-OES | 0.5 | N.D. |
| Lead (Pb) | mg/kg | With reference to IEC 62321:2008, ICP-OES | 5 | N.D. |
| Mercury (Hg) | mg/kg | With reference to IEC 62321:2008, ICP-OES | 2 | N.D. |
| Hexavalent Chromium (Cr VI) | mg/kg | With reference to IEC 62321:2008, UV-VIS | 1 | N.D. |

**Flame Retardants-PBBs/PBDEs**

| Test Items | Unit | Test Method | MDL | Results |
|---|---|---|---|---|
| Monobromobiphenyl | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Dibromobiphenyl | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Tribromobiphenyl | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Tetrabromobiphenyl | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Pentabromobiphenyl | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Hexabromobiphenyl | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Heptabromobiphenyl | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Octabromobiphenyl | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Nonabromobiphenyl | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Decabromobiphenyl | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Monobromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Dibromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Tribromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Tetrabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Pentabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Hexabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Heptabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Octabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Nonabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |
| Decabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, GC-MS | 5 | N.D. |

NOTE: (1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) ** = Qualitative analysis (No Unit)
(6) Negative = Undetectable / Positive = Detectable





SGS Testing Korea Co.,Ltd.
322, The O valley, 555-9, Hogye-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080
t +82 (0)31 4608 000 f +82 (0)31 4608 059 http://www.sgslab.co.kr ,www.kr.sgs.com/greenlab
Member of the SGS Group (Société Générale de Surveillance)

SGS

**Test Report No.** F690501/LF-CTSAYAA09-05676 Issued Date: March 09, 2009 Page 3 of 3

**Sample No.** : AYAA09-05676.001

**Sample Description** : 5252 Amber red

**Item No./Part No.** : N/A

**Halogen Contents**

| Test Items | Unit | Test Method | MDL | Results |
|---|---|---|---|---|
| Fluorine(F) | mg/kg | BS EN 14582:2007 , IC | 30 | N.D. |
| Bromine(Br) | mg/kg | BS EN 14582:2007 , IC | 30 | N.D. |
| Chlorine(Cl) | mg/kg | BS EN 14582:2007 , IC | 30 | N.D. |
| Iodine(I) | mg/kg | BS EN 14582:2007 , IC | 50 | N.D. |

**Other(s)**

| Test Items | Unit | Test Method | MDL | Results |
|---|---|---|---|---|
| PFOS(Perfluorooctane Sulfonates-Acid/Metal Salt/Amide) | mg/kg | US EPA 3540C, LC/MS | 1 | N.D. |

**Picture of Sample as Received:**


*** End ***

NOTE: (1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) ** = Qualitative analysis (No Unit)
(6) Negative = Undetectable / Positive = Detectable





SGS Testing Korea Co.,Ltd.
322, The O valley, 555-9, Hogye-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080
t +82 (0)31 4808 000 f +82 (0)31 4808 059 http://www.sgslab.co.kr ,www.kr.sgs.com/greenlab

Member of the SGS Group (Société Générale de Surveillance)

# Revision History
# (Model : SPMAMB5204)

| Date | Revision History | Writer | |
|---|---|---|---|
| | | Drawn | Approved |
| 2009.07.01. | New Version | W.H. Jung | Y.C. Kim |
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